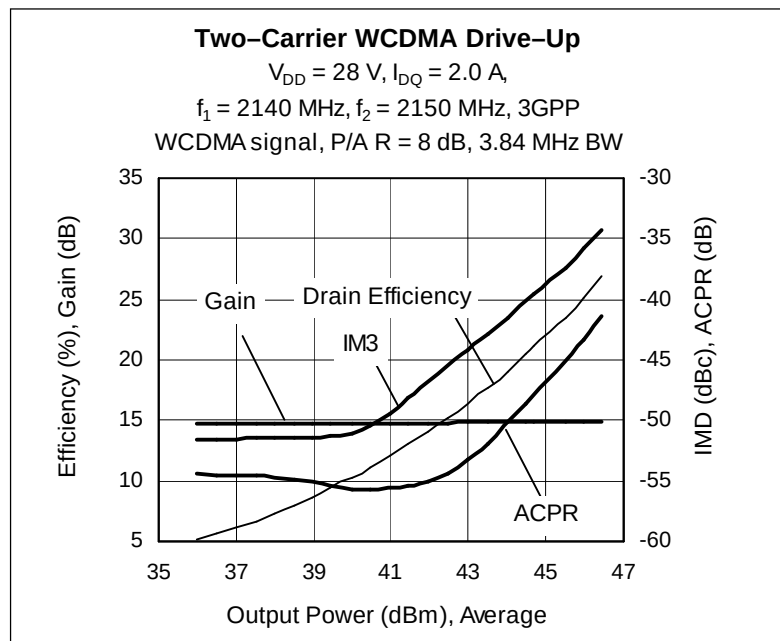


LDMOS RF Power Field Effect Transistor 180 W, 2110–2170 MHz

Description

The PTF211802 is a 180 W, internally matched, laterally double-diffused, **GOLDMOS** push-pull FET intended for WCDMA applications from 2110 to 2170 MHz. Full gold metallization ensures excellent device lifetime and reliability.



Features

- Broadband internal matching
- Typical two-carrier WCDMA performance
 - Average output power = 38 W
 - Gain = 15 dB
 - Efficiency = 25%
 - IM3 = -37 dBc
 - ACPR < -42 dBc
- Typical CW performance
 - Output power at P-1dB = 180 W
 - Efficiency = 50%
- Integrated ESD protection: Human Body Model, Class 1 (minimum)
- Excellent thermal stability
- Low HCI drift
- Capable of handling 10:1 VSWR @ 28 V, 180 W (CW) output power

PTF211802A
Package 20275

PTF211802E
Package 30275



ESD: Electrostatic discharge sensitive device — observe handling precautions!

RF Characteristics at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

WCDMA Measurements (not subject to production test—verified by design/characterization in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 2.0\text{ A}$, $P_{OUT} = 38\text{ W AVG}$

$f_1 = 2140\text{ MHz}$, $f_2 = 2150\text{ MHz}$, two-carrier 3GPP, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Units
Intermodulation Distortion	IM3	—	-37	—	dBc
Gain	G_{ps}	—	15	—	dB
Drain Efficiency	η_D	—	25	—	%

Two-Tone Measurements (tested in Infineon test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 2.0\text{ A}$, $P_{OUT} = 60\text{ W PEP}$, $f = 2110\text{ MHz}$, tone spacing = 5 MHz

Characteristic	Symbol	Min	Typ	Max	Units
Gain	G_{ps}	12.5	15	—	dB
Drain Efficiency	η_D	20	22	—	%
Intermodulation Distortion	IMD	—	-40	-38	dBc

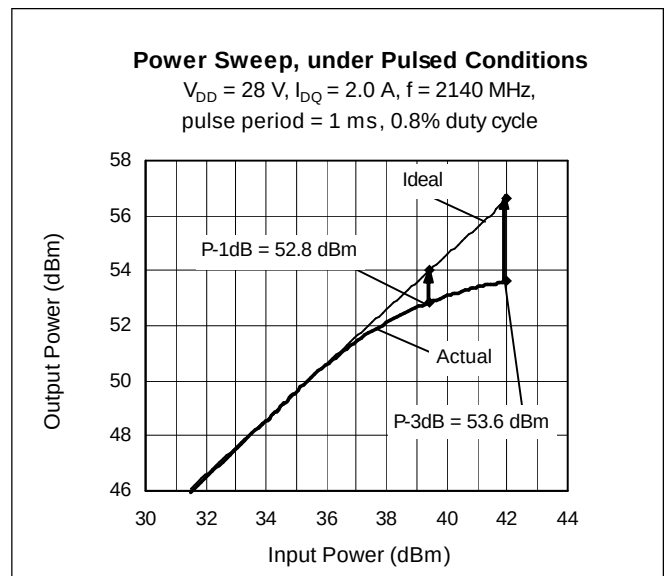
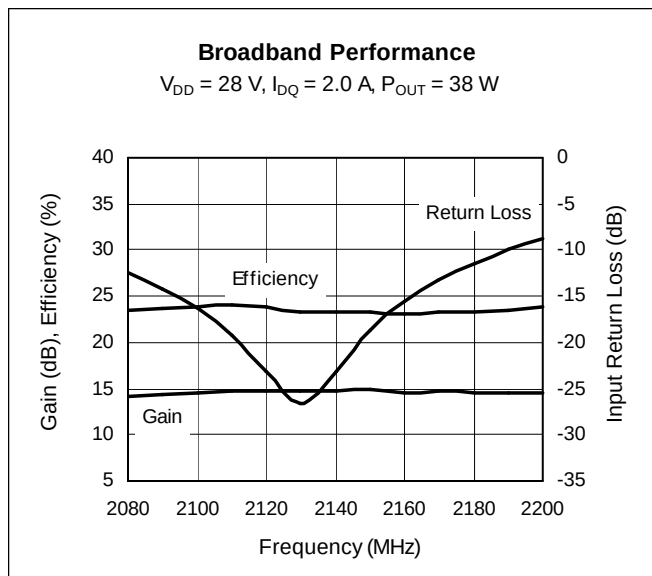
DC Characteristics at $T_{CASE} = 25^{\circ}\text{C}$ unless otherwise indicated

Characteristic	Conditions	Symbol	Min	Typ	Max	Units
Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_{DS} = 10\text{ }\mu\text{A}/\text{side}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$, $V_{GS} = 0\text{ V}$	I_{DSS}	—	—	1.0	μA
On–State Resistance	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.1	—	Ω
Operating Gate Voltage	$V_{DS} = 28\text{ V}$, $I_{DQ} = 1.0\text{ A}/\text{side}$	V_{GS}	2.5	3.2	4	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	—	—	1.0	μA

Maximum Ratings

Parameter		Symbol	Value	Unit
Drain–Source Voltage		V_{DSS}	65	V
Gate–Source Voltage		V_{GS}	–0.5 to +12	V
Junction Temperature		T_J	200	$^{\circ}\text{C}$
Total Device Dissipation	PTF211802A	P_D	498	W
Above 25°C derate by			2.85	$\text{W}/^{\circ}\text{C}$
Total Device Dissipation	PTF211802E	P_D	647	W
Above 25°C derate by			3.70	$\text{W}/^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	–40 to +150	$^{\circ}\text{C}$
Thermal Resistance	PTF211802A	$R_{\theta JC}$	0.35	$^{\circ}\text{C}/\text{W}$
($T_{CASE} = 70^{\circ}\text{C}$, 130 W CW)	PTF211802E	$R_{\theta JC}$	0.27	$^{\circ}\text{C}/\text{W}$

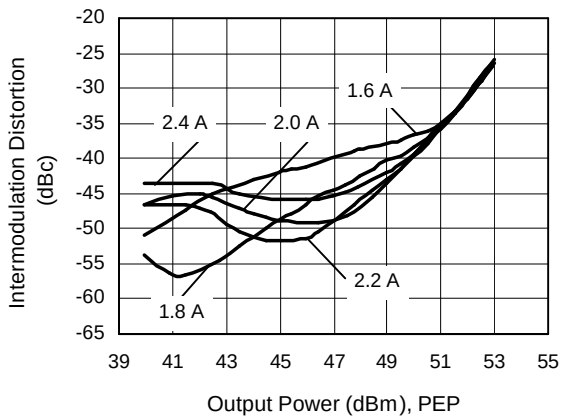
Typical Performance (data taken in a production test fixture)



Typical Performance (cont.)

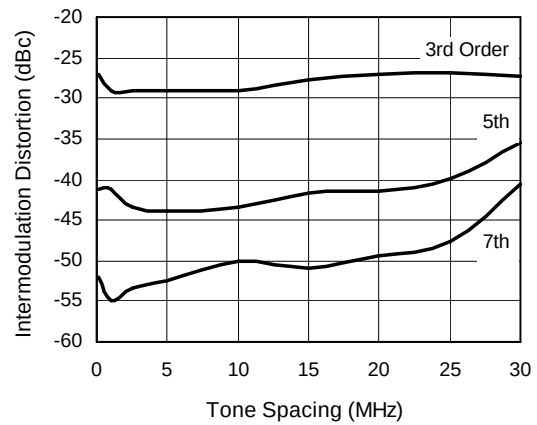
Intermodulation Distortion vs. Output Power for selected currents

$V_{DD} = 28\text{ V}$, $f = 2140\text{ MHz}$, tone spacing = 5 MHz



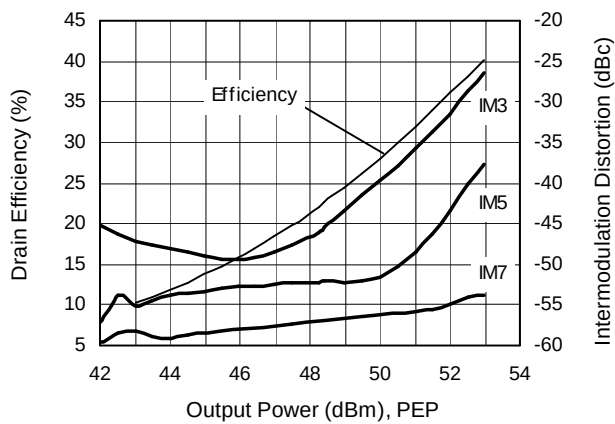
Intermodulation Distortion Products vs. Tone Spacing

$V_{DD} = 28\text{ V}$, $I_{DQ} = 2.0\text{ A}$, $P_{OUT} (PEP) = 170\text{ W}$, $f = 2140\text{ MHz}$



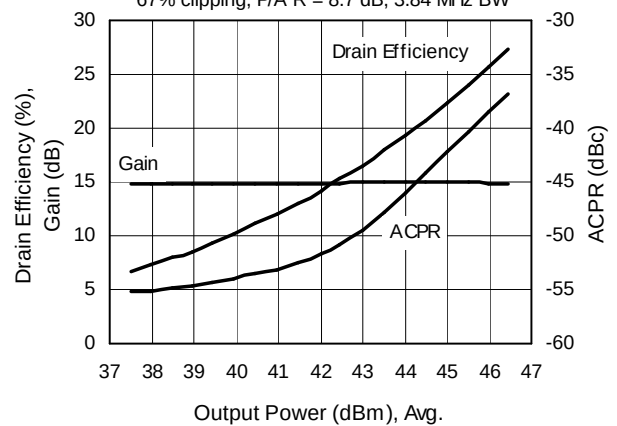
Two-Tone Drive-Up

$V_{DD} = 28\text{ V}$, $I_{DQ} = 2.0\text{ A}$, $f = 2140\text{ MHz}$,
tone spacing = 5 MHz

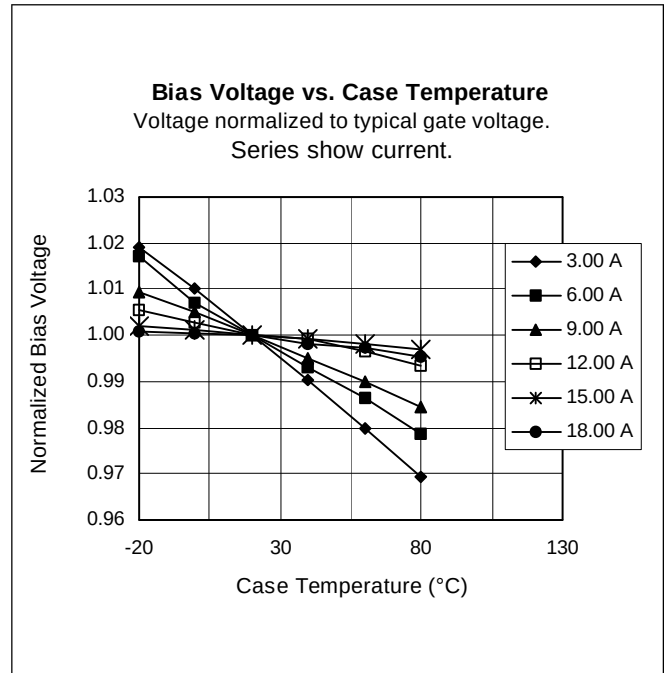
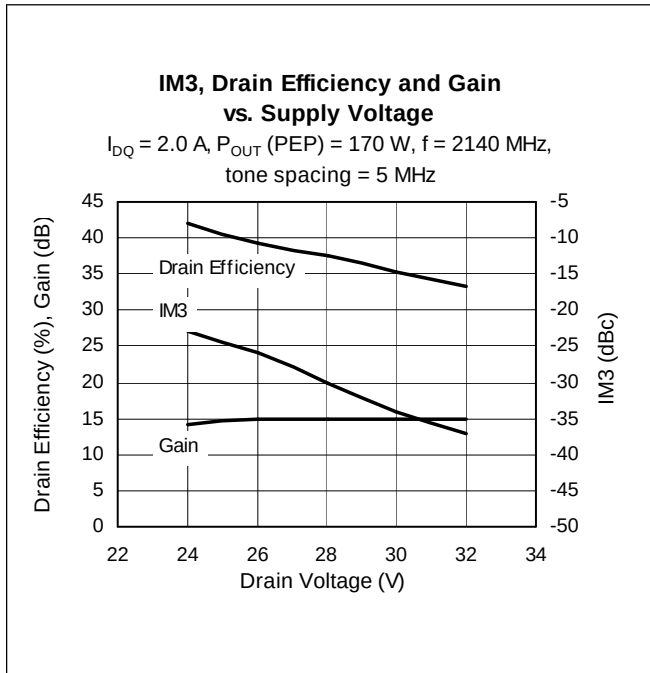


Single-Carrier WCDMA Drive-Up

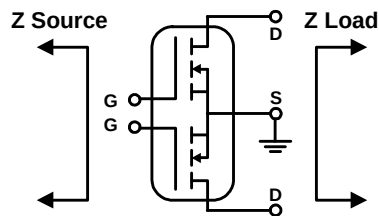
$V_{DD} = 28\text{ V}$, $I_{DQ} = 2.0\text{ A}$, $f = 2140\text{ MHz}$,
3GPP WCDMA signal, Test Model 1 w/16 DPCH,
67% clipping, P/A R = 8.7 dB, 3.84 MHz BW



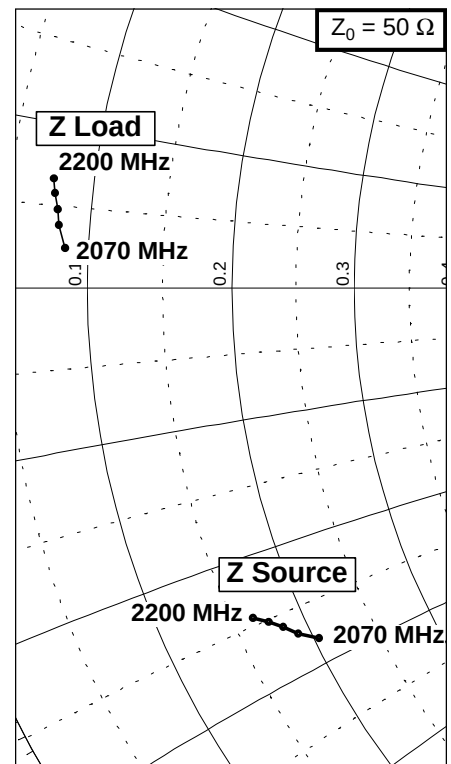
Typical Performance (cont.)



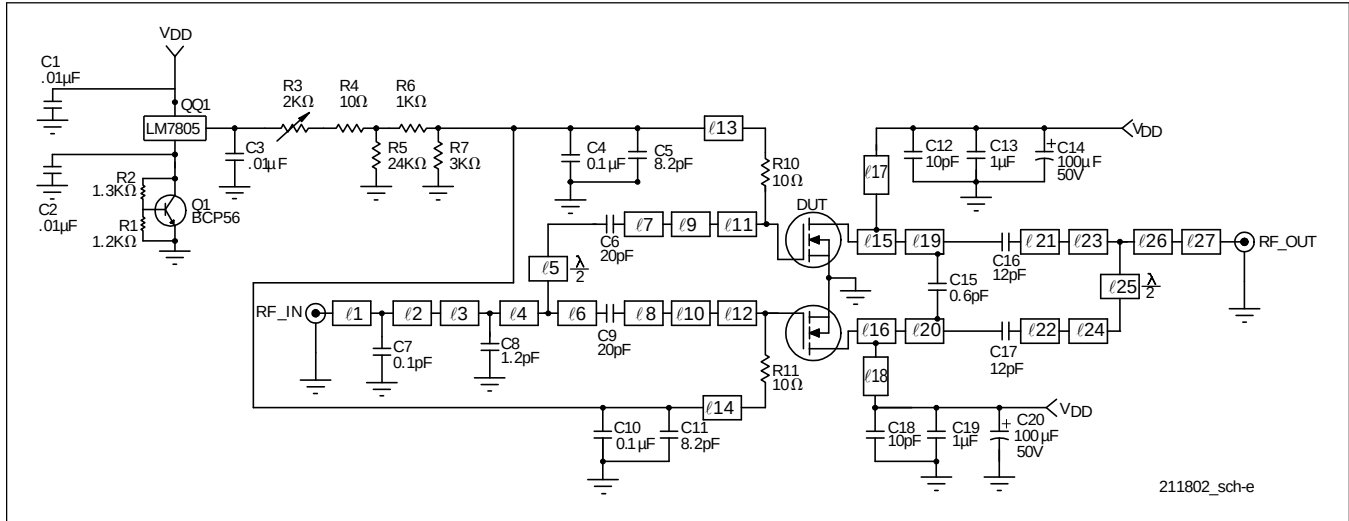
Broadband Circuit Impedance Data



Frequency MHz	Z Source Ω		Z Load Ω	
	R	jX	R	jX
2070	10.22	-14.00	4.28	1.24
2110	9.56	-13.48	4.06	1.94
2140	9.14	-13.00	3.98	2.42
2170	8.70	-12.60	3.84	2.90
2200	8.24	-12.22	3.76	3.34



Reference Circuit



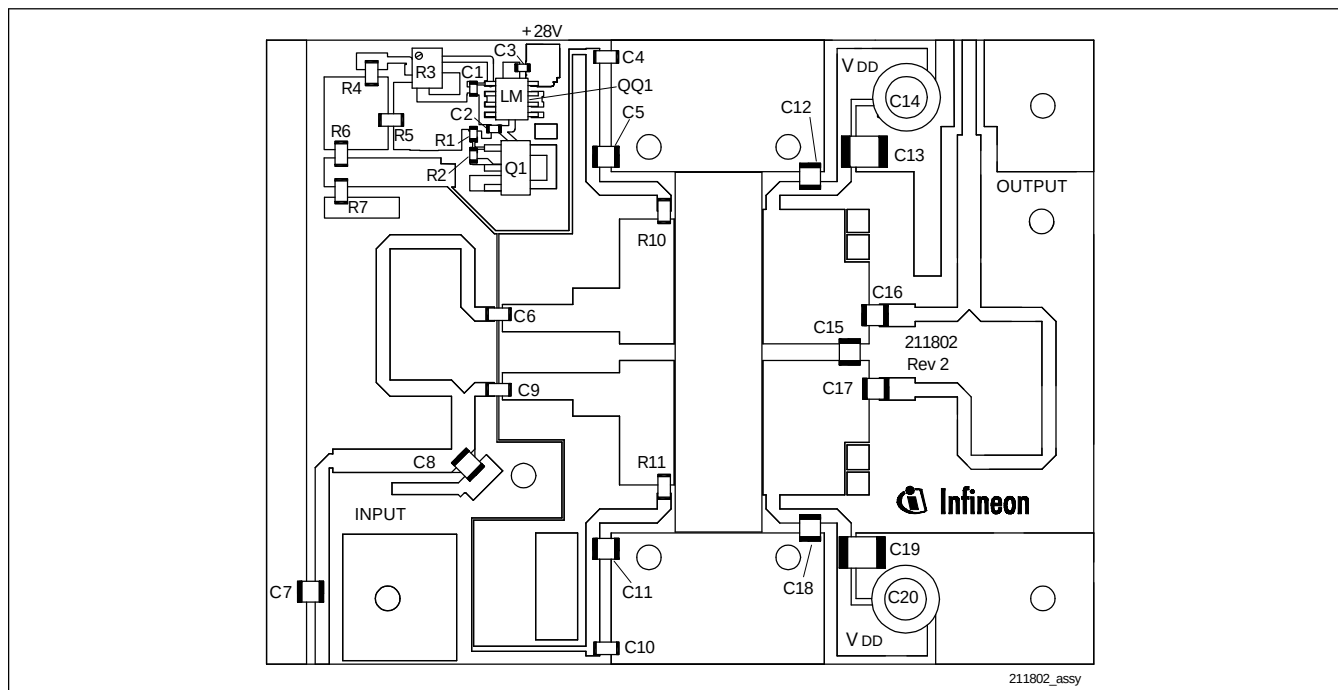
Reference Circuit Schematic for 2140 MHz

Circuit Assembly Information

DUT	PTF211802E	LDMOS transistor	
Circuit board	0.76 mm [.030"] thick, $\epsilon_r = 3.48$	Rogers 4350, 2 oz. copper	

Microstrip	Electrical Characteristics at 2140 MHz	Dimensions: L x W (mm.)	Dimensions: L x W (in.)
$\ell 1$	0.110λ , 50.0Ω	9.40×1.70	0.370×0.067
$\ell 2$	0.175λ , 50.0Ω	14.78×1.70	0.582×0.067
$\ell 3$	0.205λ , 35.4Ω	16.99×2.84	0.669×0.112
$\ell 4$	0.092λ , 35.4Ω	7.57×2.84	0.298×0.112
$\ell 5$	0.500λ , 50.0Ω	42.67×1.70	1.680×0.067
$\ell 6$	0.052λ , 50.0Ω	4.39×1.70	0.173×0.067
$\ell 7, \ell 8$	0.110λ , 31.8Ω	9.04×3.30	0.356×0.130
$\ell 9, \ell 10$	0.073λ , 22.4Ω	5.84×5.26	0.230×0.207
$\ell 11, \ell 12$	0.089λ , 9.10Ω	6.86×15.09	0.270×0.594
$\ell 13, \ell 14$	0.337λ , 50.4Ω	28.58×1.70	1.125×0.067
$\ell 15, \ell 16$	0.132λ , 8.42Ω	10.01×16.33	0.394×0.643
$\ell 17, \ell 18$	0.250λ , 50.0Ω	21.26×1.70	0.837×0.067
$\ell 19, \ell 20$	0.035λ , 13.2Ω	2.74×9.96	0.108×0.392
$\ell 21, \ell 22$	0.057λ , 36.5Ω	4.70×2.72	0.185×0.107
$\ell 23, \ell 24$	0.061λ , 50.0Ω	5.21×1.70	0.205×0.067
$\ell 25$	0.500λ , 50.0Ω	42.67×1.70	1.680×0.067
$\ell 26$	0.264λ , 35.4Ω	21.79×2.84	0.858×0.112
$\ell 27$	0.136λ , 50.0Ω	11.51×1.70	0.453×0.067

Reference Circuit (cont.)



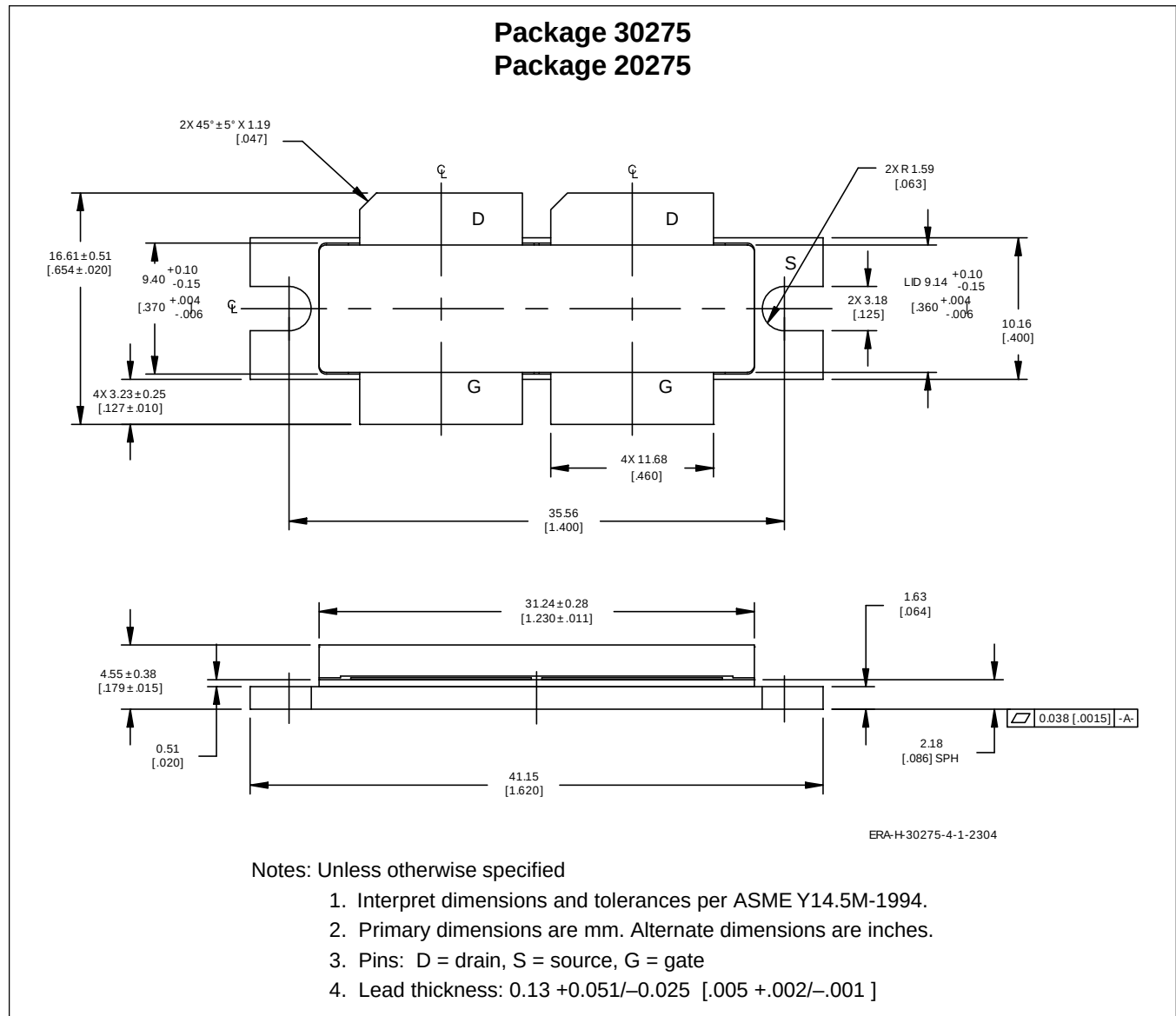
Reference Circuit¹ (not to scale)

Component	Description	Manufacturer	P/N or Comment
C1, C2, C3	Capacitor, 0.01 μ F 50 V	Digi-Key	PCC1772CT-ND
C4, C10	Capacitor, 0.1 μ F, 50 V	Digi-Key	PCC104BCT-ND
C5, C11	Capacitor, 8.2 pF	ATC	100 B 8R2
C6, C9	Capacitor, 20 pF	ATC	100 A 200
C7	Capacitor, 0.1 pF	ATC	100 B 0R1
C8	Capacitor, 1.2 pF	ATC	100 B 1R2
C12, C18	Capacitor, 10 pF	ATC	100 B 100
C13, C19	Capacitor, 1 μ F, ceramic, 50 V	ATC	920DC105KW100
C14, C20	Capacitor, 100 μ F, 50 V, electrolytic	Digi-Key	P5182-ND
C15	Capacitor, 0.6 pF	ATC	100 B 0R6
C16, C17	Capacitor, 12 pF	ATC	100 B 120
QQ1	Voltage Regulator	Digi-Key	LM 7805
Q1	Transistor	Infineon	BCP56
R1	Resistor, 1.2 k Ω , 1/10 W, 0603	Digi-Key	P1.2KGCT-ND
R2	Resistor, 1.3 k Ω , 1/10 W, 0603	Digi-Key	P1.3KGCT-ND
R3	Resistor, variable 2 k Ω , 4 W, 1206	Digi-Key	3224W-202ETR-ND
R4, R10, R11	Resistor, 10 Ω , 1/4 W, 1206	Digi-Key	P10KECT-ND
R5	Resistor, 24 k Ω , 1/4 W, 1206	Digi-Key	P24KECT-ND
R6	Resistor, 1 k Ω , 1/4 W, 1206	Digi-Key	P1.0KECT-ND
R7	Resistor, 3 k Ω , 1/4 W, 1206	Digi-Key	P3.0KECT-ND

¹Gerber Files for this circuit available on request.

Package Outline Specifications

Type	Package Outline	Package Description	Marking
PTF211802A	20275	Standard ceramic, flange	PTF211802A
PTF211802E	30275	Thermally enhanced, flange	PTF211802E



Find the latest and most complete information about products and packaging at the Infineon Internet page
<http://www.infineon.com/products>

PTF211802

Revision History: Data Sheet 2004-02-13
Previous Version: Data Sheet, 2004-01-06

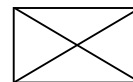
Page	Subjects (major changes since last revision)
	Combine PTF211802A and PTF211802E onto this Data Sheet.
5, 6	Alter circuit configuration

We Listen to Your Comments

Any information within this document that you feel is wrong, unclear or missing at all?
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